

What is the Reciprocal Rule in Photography?

There are extremely few true “rules” in photography. This is an odd thing to say, especially in an article explaining the “Reciprocal Rule”. In an effort to do you and I both a favour, I think it’s best to get this out of the way right here at the beginning. Whenever we refer to the Reciprocal Rule in photography as...well...a rule, just know that it’s meant as more of a helpful guide rather than an iron-clad rule. Got it? Good.

Now, onward to the good stuff!

In photography, motion is both our friend and enemy. Intentional or anticipated movement from our subjects or camera can result in magically extraordinary photos. At the same time, unintentional motion, specifically unwanted camera shake, can rob our images of sharpness and depth.



Falling short of the Reciprocal Rule requirements. 1/200th of a second at F/5.6 with a 300mm lens.

What is the Reciprocal Rule?

Banish all thoughts of high school maths and algebra classes from your mind when you read the word “reciprocal.” True, the Reciprocal Rule hints at mathematics but the technique itself is incredibly simple.

Simply put, for full-frame image sensors (more on this in a bit) the Reciprocal Rule states that your slowest shutter speed when shooting handheld should not be longer than “1” over your selected focal length in millimetres.

So, what is this magical formula?

$$\frac{1}{\text{Focal Length}}$$

Not so bad, right?

In order to reduce the appearance of inherent camera shake when hand-holding your camera, just don't allow your shutter speed to dip below the reciprocal of your focal length.

Let's drill down a little further and examine how the Reciprocal Rule works.

Why does the Reciprocal Rule work?

While the Reciprocal Rule centres around estimating exposures based on your focal length, it is not actually dependent on that variable. In fact, the reason why the focal length of your lens matters is because longer focal lengths result in more constrained angles of view (field of view). The tighter your angle of view, the more noticeable camera shake becomes.



So, shorter focal length lenses can achieve relatively long handheld exposures over longer focal lenses due to their wider angle of view – not their optical focal length. The Reciprocal Rule is useful because it takes into consideration the progressively decreasing angle of view produced as focal length increases.

Sensor Size and the Reciprocal Rule

First, a bit of history on sensor sizes, but I promise it will come back around to the Reciprocal Rule.

If you've been involved in making photos with a digital camera for any length of time, then you likely have encountered the phrase "crop factor" when talking about digital camera sensors. Albeit there are exceptions, today almost all consumer photography lenses centre around the standard 135 film format, commonly known as 35mm.

This is where the concept of "full-frame" digital sensors originated as they are roughly the same dimensions as those of a frame of 35mm film, give or take. Therefore, mounting a lens of a focal length based on the 35mm full-frame film standard to a cropped sensor camera, the field of view becomes inherently more narrow (cropped) due to the smaller sensor size.

Essentially, a cropped sensor will "zoom" a full-frame lens and cause it to have a longer effective focal length.



Every camera manufacturer's cropped sensor has a crop factor you can use to approximate the resulting focal length of a full-frame lens when used on a cropped-sensor camera.

For example, Canon's cropped sensor (APS-C) has a crop factor of 1.6x because a full-frame Canon sensor is approximately 1.6x larger than that of its cropped-sensor counterpart.



So, my 50mm lens is considered a true 50mm lens when mounted to my full-frame sensor 5D Mk II. However, if I were to mount that same 50mm to a cropped sensor 7D for example, it would instantly become approximately an 80mm lens (1.6 x 50mm) instead of 50mm.

The reason why sensor size and crop factors become important when using the Reciprocal Rule in photography is due to their effect on the effective angle of view.

The Reciprocal Rule states that I should use a shutter speed no slower than 1/50th of a second with a 50mm lens and full-frame camera.

A cropped sensor camera with that same 50mm lens would dictate a faster shutter speed be employed since the crop factor has changed the effective focal length of our lens to 80mm.

This results in a reciprocal of 1/80th of a second minimum shutter speed.

The formula would now be:

$$\frac{1.6}{\text{Focal Length}}$$

Without going much further down the rabbit hole on sensor sizes, just know that the opposite is also true when using sensor sizes larger than the full-frame standard. The resulting "reverse crop factor" would be less than 1x. It would mean that a full-frame sensor camera lens would now produce a wider angle of view, thus, increasing the duration of your allowable handheld shutter speed.

The Effects of Image Stabilization

Another aspect to consider when talking about the Reciprocal Rule is that of image stabilization. More and more often today, manufacturers are building better and more efficient image stabilization into their cameras and lenses. Many of these image stabilization systems offer upwards of 2-stops of reported stabilization (meaning you can shoot 2-stops or more slower shutter speeds).



This means that we can incorporate the approximate stops of image stabilization (should you have it) when making use of the Reciprocal Rule.

It's actually quite simple.

If you engage your lens or camera's image stabilization, you are effectively lengthening your allowable handheld shutter speed by ever how many stops the stabilization states it will compensate. Feel free to adjust the shutter speed of the Reciprocal Rule and see if you can manage even longer shutters due to the stabilization.

Final Thoughts on the Reciprocal Rule

There are very few absolutes when it comes to making photographs. Every photographer is different, and what works for one might very well not work for another.

This is especially the case when dealing with techniques such as the Reciprocal Rule in photography. Although it attempts to help us prevent unwanted camera shake by providing a quick and easy baseline shutter speed based on our lens, it should not be considered a true "rule."

Granted, some of us are simply better at holding our cameras steadier than others, but there is no replacement for practice and optimal body mechanics when it comes to producing less shaky photos.

The next time a tripod is not handy or practical, use the Reciprocal Rule to help you increase your odds of getting a sharper photo each and every time you're shooting from the hip.

So – simply put – make sure your shutter speed is faster than the maximum focal length of your lens: for example: a 300mm lens will require a shutter speed in excess of 300ths of a second.